A description of handover processes in an Australian public hospital

David T Bomba and Robert Prakash

Abstract

Handover of patient care has been an ongoing problem within the health care sector. The process remains highly variable and there is a threat to patient safety. Despite the general belief that handover transitions in patient care have become routine, not enough attention or research has been directed at improving this period of care. For this reason there is a need to provide an analysis of the communication processes during handover. A study was conducted of the handover process among doctors during shift changes within a hospital setting. The results suggested a need for process change. Results revealed a handover process which was unstructured, informal and error prone, with the majority of doctors noting that there was no standard or formal procedure for handover. The research found that the majority of hospital doctors recognised the potential benefits of formalising and computerising this process.

Aust Health Rev 2005: 29(1): 68–79

What is known about the topic?

The nature of health care delivery regularly requires the transfer of responsibility for patients from one health care professional to another. While there have been concerns raised about the effectiveness of the handover process there are relatively few medical studies describing or promoting safe transition methods.

What does this paper add?

This paper reports on the results of a study of medical handover at one NSW hospital that found the handover process to be informal, unstructured and a possible contributing factor to errors in patient care. The study comprised a questionnaire completed by a range of medical staff, interviews and direct observation of the handover process by the authors.

What are the implications for practitioners?

Hospital managers and clinician leaders should review and look for ways to improve the quality and safety of the handover process. Specifically, the authors suggest the need for standard handover procedures to be developed throughout the hospital.

MAINTAINING CONTINUITY BETWEEN WORK SHIFTS is important in all continuous process operations, especially in the health care sector. It is particularly crucial when one considers the continuity of care a hospitalised patient requires, which extends past a single doctor or team. A shift handover mechanism is needed to allow personnel changes with minimum disruption to the functioning of a ward or unit in a 24-hour work context. The goal of handover is the accurate and reliable communication of task-specific patient information across shift changes, thereby ensuring a relatively safe and effective continuous work environment.[1] The motivation behind this research is to gain a better understanding of how handover operates and to identify recommendations to improve the process.

Handover in hospitals

In most hospitals, clinical records are still stored on paper.[2] Medical staff keep track of current patients' conditions using hand-written charts. These charts are then either left at the patient's bed or at the service bench at each ward. The work of the Institute of Medicine has pointed out the inefficiencies in paper-based systems, such as

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loss of records and information, duplication of data, and incorrect data and storage, and highlights the need for more efficient information systems.[3]

Problems with the handover process are not new and have been reported in past studies, for example, McKenna.[4] Miller described the four main styles of the handover process: recorded, the bedside, written and verbal (traditional).[5] Three recommendations were made for improvement: the need for regular reviews of the handover process, written guidelines for content of handover and the use of a pre-prepared handover sheet. McKenna and Walsh also reported on the need for better models to address the handover process.[6] In a study by Roughton and Severs of junior doctor handover practices, it was found that existing handover processes did not meet doctors' expectations and there was a lack of advice and guidance on the structure of handover.[7] The authors highlighted the opportunity to use information systems to help structure the process.

Handover is highly dynamic, relying heavily on interpersonal communication as an essential component of the process. A study conducted by Kerr showed handover in a paediatric hospital to be a very complex communication event, with a range of socially and technologically distributed practices and multiple functions.[1] Kerr[1] and Lardner[8] both identified handover in their studies as partitioned into three phases: pre-handover, an inter-shift meeting, and post-handover. Typically, handover occurs across varying levels of experience, knowledge, and roles. In addition, the nature of the communication may vary from chaotic, during periods of stress and multi-tasking, to organised and deliberate under controlled conditions. Beyond these immediate ambient factors, information transfer may also vary due to a lack of standardisation in the transition process and due to inherent difficulties with the degree of certainty attached to particular diagnoses.

As one of the most commonly performed tasks in medicine, handover plays a vital role in the continuity of care. It is surprising to note that, aside from some observations in nursing and the intensive care unit,[9] there are relatively few medical studies describing transitions or promoting safe transition methods.[10] There is a distinct need for both quantitative and qualitative data on the nature of transitions/handover between medical staff.

The effective transfer of knowledge from one hospital care provider to another is an essential component of a safety culture. Communication breakdown has been identified as a critical component of treatment delays and poor outcomes and is characterised by insufficient or inaccurate data, mistimed or delayed information, poorly organised data, the insertion of 'pseudo-information', and cognitive overload.[11] Key variances refer to Error-Producing Conditions (EPCs) and Violation-Producing Behaviours (VPBs) that typify ambient conditions in many hospital departments, and pose threats to patient safety and quality of care.[11] EPCs and VPBs are common in a variety of other workplaces, but in medicine the situation might be expected to be considerably worse for several reasons. Kuhn contends that medicine is a poorly structured domain with inadequately defined concepts and boundaries, and little agreement on clinical and operational solutions.[12] In particular, emergency medicine exemplifies this even more than other medical specialties by virtue of its unique operating characteristics: multiple and often overlapping patient encounters, unscheduled care, incomplete historical data, unpredictable patient presenting conditions and variable practice settings. All of these are exacerbated during transitions.[13]

The Australian Federal and State governments are allocating greater resources to modernising health care. "State governments are planning to spend $1 billion on health computer systems as they race to modernise hospitals amid mounting concerns over patient deaths from medical mistakes".[14] At present, some hospitals have implemented information systems for pathology, radiology and pharmacy. However, this requires physicians to log on, wait for password clearance, find the patient and look up laboratory results on a computer to find the desired test, etc. Some may also see this interruption in flow as complex and

1 Participating groups

Group type	Total employees	Respondents	Percentage of total for group type
SS	30	10	33%
RMO	13	7	54%
VMO	69	30	43%
JMO	32	27	84%
Total	144	74	51%

SS = Staff Specialists. RMO = Resident Medical Officers. VMO = Visiting Medical Officers. JMO = Junior Medical Officers

inefficient, removing the decision-maker from patient care. A common practice in hospital settings is the attending doctor having to sift through numerous illegible nursing notes to find reports on patient care. If a more social, knowledge-sharing environment can be fostered, which overcomes professional boundaries and egos, perhaps there would be a better flow of verbal communication from nurse or resident to attending doctor and back. With an environment of cooperative and joint responsibility, flow of information could be seamless.[11] Creating and sustaining an environment where this ideal occurs is perceived as vital to safety and excellence.

Research method

The aim of this study was to investigate the process for the handover of patient information at a general metropolitan hospital in New South Wales and to identify common problems related to the handover process in an attempt to highlight the need for process change.

A qualitative and quantitative approach to the research was undertaken as it is the researchers' belief that the process of understanding a social or human problem is based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting. Handover can be represented as a social or human problem. Three data collection methods were used: questionnaires; informal interviews; and on-site observation. A series of interviews and a questionnaire were used to determine awareness, and to identify issues with the handover process as well as social and organisational barriers to the process in a hospital setting.

Setting

The study was conducted at an accredited General Metropolitan Hospital which is an associated teaching hospital of the University of New South Wales and provides inpatient and community-based services to a region of about 200 000 residents. On average, the hospital employs 950 full-time staff and has had average admissions of around 20 000 inpatients for the past 3 years. Between the dates of May 2003 and July 2003, a questionnaire, observations and interviews were aimed at staff working in the general medicine ward and the emergency department. The study was approved by the Chief Executive Officer and Head of Medical Services of the hospital and by the University of Wollongong Human Research Ethics Committee.
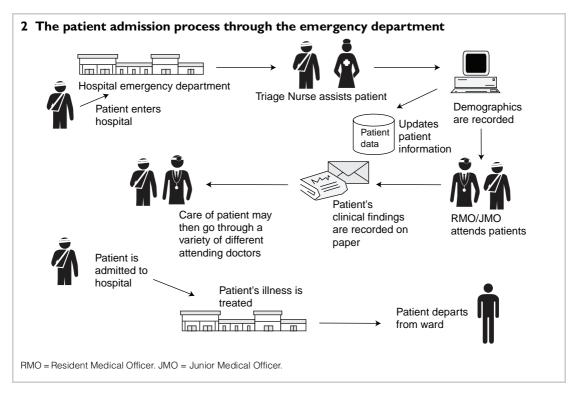
Participants

Four main groups of doctors were sampled: Visiting Medical Officers (VMOs); Resident Medical Officers (RMOs); Staff Specialists (SS); and Junior Medical Officers (JMOs) (Box 1).

Questionnaire

A questionnaire was constructed that included a combination of questions with yes/no answers, partially closed questions, closed questions and questions requiring the respondent to rate their attitudes and opinions on a Likert scale. The questionnaires were pilot-tested for content validity, structure and clarity with three male and female respondents with different positions (senior registrar, head of medical services and a JMO) within the hospital.

The questionnaire was distributed to all medical staff who we thought had direct involvement in the handover process during a 2-week period commencing 1 June 2003. The purpose was to identify which participants were directly affected by the

2 The patient admission process through the emergency department

Hospital emergency department

Patient enters hospital

Triage Nurse assists patient

Demographics are recorded

Patient data — Updates patient information

RMO/JMO attends patients

Patient's clinical findings are recorded on paper

Care of patient may then go through a variety of different attending doctors

Patient is admitted to hospital

Patient's illness is treated

Patient departs from ward

RMO = Resident Medical Officer. JMO = Junior Medical Officer.

problem and elicit their opinions of handover. Of the 144 doctors who worked at the hospital between 8 May and 22 July 2003, 74 completed the questionnaire, with a response rate of 51%. The nature of medical officers' work constraints combined with the redevelopment occurring at the hospital prevented some staff from being able to participate. Box 1 shows a breakdown of the participating groups for the questionnaire.

The questionnaire was concerned with the handover procedure in general, building on the problem areas suspected as a result of the literature review. The questionnaire was used to gather data about the information used during handover, where handover occurs and staff knowledge of the handover process. It further identified potential key variances which were followed up during interviews.

Respondents failed to complete questions that were open-ended or partially closed-ended to a greater extent than the yes/no questions. In addition, some questions were not completed where the doctors didn't have knowledge of the depart-
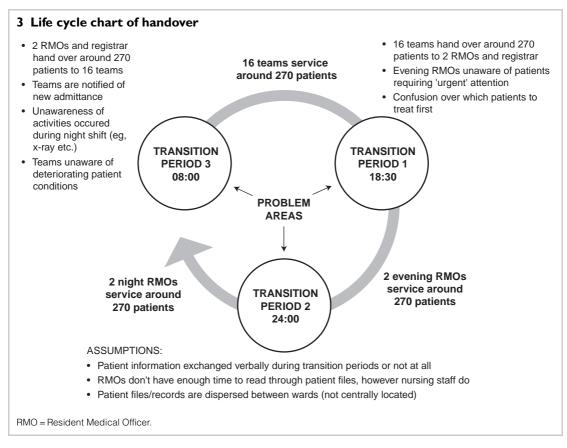
mental operations. For example, respondents were asked to rate certain actions in each department, however many hadn't worked in the departments listed.

Observation

The participant observation techniques included the observation of processes and events, attendance at meetings, extensive informal discussions with employees, cultivation of key informants who had worked for the organisation for several years and examination of reports of reviews and audits. Shift-to-shift transition of medical staff and the patient admission process were observed (see Box 2 and Box 3) across a 2-week period by the Performance and Support Unit (PSU) of the hospital. The findings were discussed at PSU meetings with the researchers and key informants, and notes were taken.

Interviews

Semi-structured interviews were conducted with informants at different levels of seniority. They

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3 Life cycle chart of handover

- 2 RMOs and registrar hand over around 270 patients to 16 teams
- Teams are notified of new admittance
- Unawareness of activities occured during night shift (eg, x-ray etc.)
- Teams unaware of deteriorating patient conditions

- 16 teams hand over around 270 patients to 2 RMOs and registrar
- Evening RMOs unaware of patients requiring 'urgent' attention
- Confusion over which patients to treat first

16 teams service around 270 patients

TRANSITION PERIOD 3 08:00

TRANSITION PERIOD 1 18:30

PROBLEM AREAS

2 night RMOs service around 270 patients

2 evening RMOs service around 270 patients

TRANSITION PERIOD 2 24:00

ASSUMPTIONS:
- Patient information exchanged verbally during transition periods or not at all
- RMOs don't have enough time to read through patient files, however nursing staff do
- Patient files/records are dispersed between wards (not centrally located)

RMO = Resident Medical Officer.

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were conducted before and after the questionnaire was distributed, collected and analysed. The interview schedule set out in Box 4 was developed following discussions with interdisciplinary staff and two pilot interviews. It probed personal opinions of handover. The aim of the semi-structured interview was to corroborate not only the data from the questionnaires but also the knowledge acquired from the review of the handover literature. Each interview lasted between 25 and 45 minutes and was recorded using a dictaphone. After each session a written summary of the researchers' interpretation was sent to the participants for any comments regarding the findings.

Results

Observation and interview results

There is no formal, systematic handover process in place for after-hours on-call junior medical staff, which leads to a lack of communication between medical staff. Ninety-five per cent of respondents did not identify a formal or set procedure for handover. It is believed that this lack of structure leads to duplication of such things as pathology requests, and results in delays in identifying patients whose condition requires close monitoring without prompting by nursing staff.

The PSU observation found that medical staff on after-hours shifts covered numerous patients without a clear indication of patients of concern until they were paged to review them, and patient information was being transferred verbally or not at all. In observing the handover process, information was also collected on the admission process as this process was directly related to handover. A simplified diagram of the process of admitting a patient to the hospital through the

emergency department can be seen in Box 2.

The Director of medical services at the hospital estimated that 90% of all patients admitted to hospital arrive through the ED. The other 10% of patients are admitted directly by a specialist doctor. Before a patient is seen by a doctor, his or her demographic details are entered into the hospital-wide patient database. The JMO or RMO on duty attends the patient and records the clinical information on paper. It not unusual for a patient to be seen or transferred by more than one doctor before being admitted to hospital. Once the diagnosis on admission has been verified, the patient is then moved to a ward appropriate for the problem or illness.
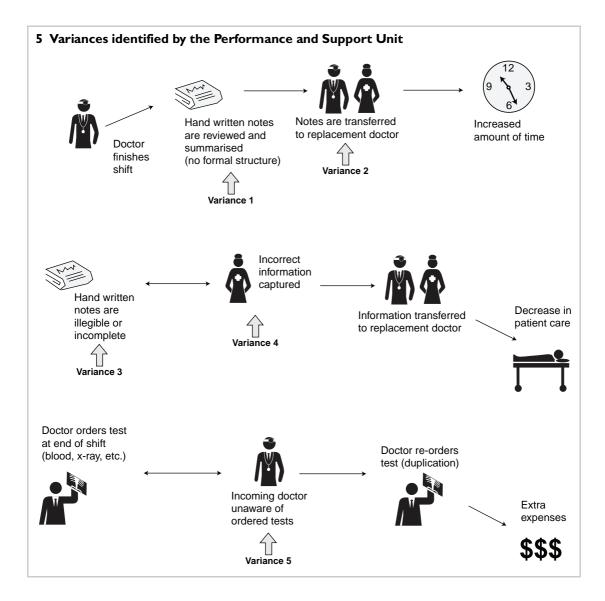
Box 3 shows the handover process as observed by PSU in the form of a life-cycle chart. There are three transition periods occurring in one day. Transition period one and three were observed to be most problematic as 16 teams of doctors must give two individuals information on many of the 270 (on average) inpatients, and two individuals must give 16 teams information on the patients. It is noted that 10 minutes before shift change is delegated to transferring information about patients of concern to the incoming doctor. However, this is not a formal activity and remains at the doctor's discretion. It was also noted that many finishing doctors had their own ways in which to notify the incoming doctor of patients of concern. It was also observed that during many shift changes incoming doctors were not notified by the outgoing doctor; that is, handover did not occur.

An overlying EPC is transition error, describing error that arises through transitions of care of the patient from any health care worker to another. Transitions are interruptions or 'gaps' in the continuity of care and present opportunities for a variety of errors to occur.[15] The major problems or key variances are summarised in Box 5. A variance is defined as a weak link in the system's processes where it becomes difficult to achieve required or desired standards. The identified variances listed below affect the quality of operational procedures and have associated social costs:

- Lack of format or structure producing inconsistent information;
- Notes contain too much information and take too long to transfer;
- Hand-written notes are illegible or incomplete;
- Incorrect categorisation or error-prone information is transferred;
- Being able to identify patients of concern and locating the replacement doctor; and
- Communication breakdown causes duplication of tests.

Box 6 provides more detail about the five identified variances. Mumford believes that it is important not only to identify key variances but also to locate where the variance occurred and the actions taken to correct the variance.[16] The respondents were asked a series of questions regarding the five identified key variances. Their responses are summarised in Box 6.

5 Variances identified by the Performance and Support Unit

Doctor finishes shift

Hand written notes are reviewed and summarised (no formal structure)

Variance 1

Notes are transferred to replacement doctor

Variance 2

Increased amount of time

Hand written notes are illegible or incomplete

Variance 3

Incorrect information captured

Variance 4

Information transferred to replacement doctor

Decrease in patient care

Doctor orders test at end of shift (blood, x-ray, etc.)

Incoming doctor unaware of ordered tests

Variance 5

Doctor re-orders test (duplication)

Extra expenses

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Box 7 lists the variances and provides an indication of their rank in importance and how they might be addressed. The most important variances were identified by the respondents as issues relating to patients requiring attention and illegible notes.

Questionnaire results

Box 8 and Box 9 show the doctors' responses towards handover during the week and during weekends and public holidays. Forty-six per cent

of respondents believed that handover did not occur during day to evening shift on weekends and public holidays, whereas 53% believed that it occurred sometimes during the same time on weekdays. The evening to night shift and the night to day shift reported handover most often.

Patient types and handover

As shown in Box 10, respondents were asked whether handover of stable and unstable patients occurred. Sixty-one per cent of respondents

believed handover never occurs for patients declared stable at the time of diagnosis, whereas 36% of respondents believed that handover always occurs for unstable patients.

The use of documentation for handover

Fifty per cent of respondents engaged in verbal conversation during handover. Forty-two per cent made use of hand-written notes and 8% accessed the patient record during handover.

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6 Details of variances

	Variance 1	Variance 2	Variance 3	Variance 4	Variance 5
Where variance occurred	RMO quarters; cafeteria; during shift; ward; ED	Telephone; RMO quarters; end of shift; ward; ED	During and after shift	During handover; beginning and end of shift	End of shift; patient's bedside
Where it showed up	Performance and support meeting	Performance and support meeting	End of shift; during handover	Wards; nursing bench; ED (where handover occurred)	Test site (eg, pathology, radiology etc.)
Who corrected and where	Support officer/ review committee (not corrected)	na	Note writer (doctor); RMO quarters/ward	Nurses/staff; corrected at place of handover	Uncorrected; duplication of tests
What was done to correct the problem	Not corrected; notes still lack formal structure	Not corrected	Notes deciphered by owner; incomplete not corrected	Information re-captured by next doctor on duty; nurses paging doctors	Uncorrected
What information was/is needed for correction	Patient record; doctors opinions	Process restructuring; review of handover	Patient record; re-examination of patient etc.	Patient record; symptoms, signs, tests, examinations	Up-to-date information on advance standing tests

RMO = Resident Medical Officer. ED = Emergency Department. na = not applicable.

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7 Importance of the variances

Variance	How to remove/reduce	Rank*
Delays in identifying patients whose condition requires close monitoring	Better checking and highlighting of patient status	1
Unreadable or error-prone note taking	Check and refine note taking	1
Replacement doctors cover patients without a clear indication of patients of concern	Better management of patient conditions	1
Unable to locate replacement doctor	Have replacement doctor find you	1
Incorrect categorisation	Add formal structure to process	2
Duplication of procedural requests eg, blood tests, x-ray	Better management of patient conditions and procedural requests	2
Summaries take too long	Better summary process	3
Inappropriate information summarised	Better summary process	3
Inconsistent patient information	Add formal structure to taking notes	4
Inconsistent patient information	Add formal structure to taking notes	4

*Variances are ranked in importance from 1 to 5, 1 being most important.

8 Handover during weekdays

	Day to evening		Evening to night		Night to day	
Response	Respondents (*n*)	%	Respondents (*n*)	%	Respondents (*n*)	%
Never	12	21	3	5	24	42
Sometimes	30	53	4	7	19	33
Usually	3	5	14	25	4	7
Always	12	21	36	63	10	18
Total	57	100	57	100	57	100

9 Handover during weekends and public holidays

	Day to evening		Evening to night		Night to day	
Response	Respondents (*n*)	%	Respondents (*n*)	%	Respondents (*n*)	%
Never	6	46	0	0	0	0
Sometimes	0	0	0	0	2	17
Usually	2	15	4	31	4	33
Always	5	39	9	69	6	50
Total	13	100	13	100	12	100

Twenty-eight per cent of respondents reported they always accessed handwritten notes during handover, and all respondents reported accessing handwritten notes at least sometimes during handover (see Box 11). On the other hand, 47% of respondents reported they never accessed the patient record during handover and 71% of respondents reported always using verbal conversations during handover.

10 Stable and unstable patient handover

	Stable patients		Unstable patients	
Response	Respondents (*n*)	%	Respondents (*n*)	%
Never	45	61	0	0
Sometimes	20	27	2	3
Usually	9	12	45	61
Always	0	0	27	36
Total	74	100	74	100

Information transferred during handover

Many of the respondents indicated transferring more than one piece of information during handover (148 responses from 74 respondents). As seen in Box 12, the most common information transferred to the replacement doctor was symptoms (29%). Twelve per cent of respondents mentioned transferring other information, including plan of care, problems encountered during the day, diagrams, examinations, and treatment details.

When questioned about how they remember patient information during their shift, equal numbers of respondents indicated they either used their memory or wrote on a note pad. None of the respondents indicated that they used a dictaphone, a computer or a portable device to remember patient information.

Location of handover

As illustrated in Box 13, handover mostly occurred by telephone in two of the three shifts, with 56% of respondents using the telephone in the day to evening shift and 79% using the telephone in the night to day shift.

11 Documentation used for handover

Response	Hand written notes		Verbal conversations		Patient record	
	Respondents (*n*)	%	Respondents (*n*)	%	Respondents (*n*)	%
Never	0	0	0	0	34	46
Sometimes	32	44	0	0	30	41
Usually	21	28	21	28	1	1
Always	21	28	53	72	9	12
Total	74	100	74	100	74	100

12 Patient information transferred during handover

Response	Respondents (*n*)	%
Symptoms	42	29
Test/Results	36	24
Signs	30	20
Referrals/Consultations	22	15
Other	18	12
Total	148	100

Comparison with other hospitals

The respondents were asked their opinion of whether handover is more comprehensive, less comprehensive or the same compared with other hospitals. Ninety-eight per cent of respondents believed that handover was much the same as in other hospitals in which they have worked. Two per cent believed it was less comprehensive at this hospital.

Discussion

A more structured approach to handover is needed with standards for doctor-to-doctor transition.[15] However, restructuring the system or process to operate more efficiently demands not only a change in administration but also in the social system and the culture of the organisation, as the handover process is predominantly a social, verbal interaction. As a result of missing information the traditional paper chart readily provides only about a third of the data that a doctor needs while providing patient care,[17] and the data that is there may be inaccurate. Moreover, the lack of structure makes it difficult to find specific information quickly.

The study has highlighted several problems during handover. They can be classified into two broad areas:

■ Medical record keeping problems
→lack of format or structure producing inconsistent information

13 Locations where handover occurs

Response	Day to evening shift		Evening to night		Night to day	
	Respondents (*n*)	%	Respondents (*n*)	%	Respondents (*n*)	%
Specific ward	18	15	6	8	3	21
Emergency Department	13	11	23	31	0	0
Telephone	68	56	17	23	11	79
RMO quarters	22	18	23	31	0	0
Cafeteria	0	0	5	7	0	0
Total	121	100	74	100	14	100

→notes contain too much information and take too long to transfer

→hand-written notes are illegible or incomplete

→incorrect or error-prone information is transferred

- Communication problems

→communication breakdown causing duplication of tests

→locating the replacement doctor for handover is time consuming.

Medical record keeping is a hurried, ancillary activity in the ED. Clinicians may not have enough time to completely and accurately fill out the forms comprising the paper records, and the required health information is sometimes unavailable or of questionable accuracy as the notes are written. Physicians' and nurses' notes may be illegible if handwritten, or inaccurate if dictated and then transcribed. Detailed descriptions of the patient's health problem and the reasoning behind diagnoses and choices of services may be left out or abbreviated because they are hard to summarise and tedious to record. Voluminous data from physiological monitors are difficult to record accurately by hand.

Communication problems often arise during handover. Although the majority of doctors conduct telephone handover, handover seems to occur in a number of other locations at the discretion of the leaving doctor. Difficulties in locating the replacement doctor arise, often removing the attending doctor for a period of time, interrupting the continuity of care. Duplication of tests may also occur, and laboratory and radiological reports may be missing because of filing or communication errors.

After conducting interviews and observing the handover process, the results revealed a process which was unstructured, informal and error prone, with the majority of doctors (70 out of 74) noting that there is no standard or formal procedure for handover. This is consistent with the studies of McKenna,[4] Beach et al,[11] Coiera and Tombs,[18] and Coiera.[19] Our research suggested that the majority of hospital doctors surveyed recognised that the existing handover process needed to change. Furthermore, doctors realised

the potential benefits of trying to formalise and standardise this process, which should clearly flag patients of concern, record standing test orders and promote effective time management for junior medical staff.

Study limitations

The research has some limitations which need to be acknowledged. The scope was restricted to a small study examining handover in one medical ward and the ED. However, there are a number of other wards and departments which could benefit from this type of study, and there is an immediate need to characterise accurately the size and form of different communication flows, including face-to-face conversations. Our results should be understood within the limitations of the methodology adopted. Best efforts were made to triangulate results between observation, interviews and the questionnaire. However, the resulting findings may not have statistical significance. It is also a possibility that subjects may have altered their behaviour because of the presence of observers.

Conclusion

The complexity of medical care has greatly increased during the past 30 years. More technology, more professionals, and more support services are involved in the care of patients. Today's medical care institutions encounter problems coordinating and communicating the data necessary for clinical care. Medical professionals must note and remember increasing amounts of data about each patient from an expanded number of diagnostic tests and therapeutic procedures. Physicians are also faced with the task of memorising information about new diagnostic tests and treatments; knowledge that must be constantly updated. These problems are exemplified in hospital settings where time constraints add to the pressures.

Hospitals seem to suffer enormous inefficiencies because of poor communication infrastructure and practices.[18] Communication problems are seen as the most common cause of preventa-

ble disability or death in Australian hospitals.[20] The handover procedure is predominantly a communication process involving the passing of patient information and care through a number of medical personnel. Studies conducted on patient handover acknowledge that little attention or research has been directed to this procedure in hospitals.[1,5,8,11,18,20]

This study highlighted the need for process change, consistent with the work by Roughton and Severs[7] and McKenna.[4] The study provided a qualitative and quantitative analysis of a hospital's handover process. The survey results revealed a handover process which was unstructured, informal and error prone, with the majority of doctors (95%) surveyed noting that there was no standard or formal procedure for handover. The majority of hospital doctors surveyed recognised the potential benefits of formalising and computerising this process. This supports Miller's suggestion that handover procedures need to be regularly reviewed and that structured guidelines for the content of handover should be established.[5] Implementation of a standard procedure is required for effective transfer of patient information from one doctor to another.

Competing interests

None identified.

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